

**REMARKS/ARGUMENTS**

In response to the Office Action dated September 23, 2004, claims 1, 4, 8 and 15 are amended. Claims 1 through 22 are now active in this application. No new matter has been added.

The continued indication that claims 2, 9-13 and 16 would be allowable if rewritten in independent form including all the limitations of the base claim and any intervening claims is acknowledged and appreciated.

**REJECTION OF CLAIMS UNDER 35 U.S.C. § 102 AND § 103**

I. Claims 1, 4-8, 15 and 17-20 are rejected under 35 U.S.C. § 102(b) as being anticipated by Lobregt (USPN 5,559,901).

Lobregt discloses a device for defining an outline of a region of an object, such as an organ or a tumor for a CT-scanner or magnetic resonance imaging used in a medical field. In addition, a primary gist of the present invention is different from that of Lobregt.

To expedite prosecution, independent claim 1 is amended to delineate, *inter alia*:

...calculating estimation values for surfaces to be deformed by shrinking edges or surfaces of a polygon model by converging two or more vertices of the polygon model based on distances between the respective deformed surfaces after each deformation resulted from the convergence of the vertices and all of the original vertices before convergence involved in the surface deformation resulted from the convergence of the vertices...

Independent claim 8 is similarly amended.

In addition, independent claim 4 is amended to delineate, *inter alia*:

wherein before each data reduction, the portion that the estimation value thereof is necessary to be recalculated for the predetermined estimation method as a result of the previous data reduction by the convergence of the vertices is defined as a reduction prohibition area, and a succeeding data reduction by the

convergence of the vertices is applied to a portion other than the reduction prohibition area.

Independent claim 15 is similar amended.

The purpose of the above amendments is to emphasize the difference between the present invention and Lobregt. In Lobregt, it is disclosed that i) the vertices tend to cluster in corners of the contour, as a defect of the known method, (see column 2, lines 33 to 36), and ii) when the vertices falls on a specified threshold, the connected vertices are replaced by a single vertex (as a result, the number of the vertices are reduced, in other words, the vertices are converged.) (See column 6, lines 1 to 5, and claim 6 of Lobregt). However, Lobregt does **NOT** disclose a method or device for converging vertices.

In the current amendment, the phrase “resulted from the convergence of the vertices” is repeatedly emphasized to clarify the difference between the present invention and Lobregt.

In Lobregt, when the respective vertices come too close to each other (i.e., a distance between the vertices falls below a predetermined value), the edge and the connected vertices are replaced by a single vertex. However, it is not believed that in Lobregt, the index is a distance between a surface after deformation (resulted from the convergence of the vertices) and an original vertex involved in the deformation of the surface (resulted from the convergence of the vertices).

At column 11, lines 30-51, Lobregt describes:

i) a first pass: checks along the entire contour if any segment length has become shorter than the minimum length ( $L_{min}$ ; a first parameter). If such an edge segment is found, this edge segment is removed from the contour by replacing the two vertices on both ends of this segment by one single vertex at a position exactly in-between the replaced vertices.

ii) a second pass: checks again along the entire contour, but now for segments with a length larger than the maximum length ( $I_{max}$ ; a second parameter). In this case a vertex  $V_{j+1}$  is inserted halfway in between vertices. When  $V_{j+1}$  is inserted between  $V_i$  and  $V_{i+1}$ ,  $V_{j+1}$  is to be relabeled to  $V_{j+2}$  ( $V_{j+1}$  is changed to  $V_{j+2}$ ).

The relation between these parameters, such as the minimum length and the maximum length, is constrained by not acknowledging an oscillatory behavior, in which vertices are repeatedly removed in one resampling action and inserted again in the next.

What the Examiner contends is that a threshold value (the shortest length and the longest length between the vertices) is determined to a value that will **NOT** repeat the removal and insertion of the vertices at the same position, namely, a value that will never have an oscillatory behavior.

First, the Examiner compares a vertex to be relabeled to a portion that the estimation value necessarily is to be recalculated (see the Official Action page 3, from the 5<sup>th</sup> line from the bottom). However, the re-labeling results only when the vertices are increased. No re-labeling is necessary when the vertices are replaced by one vertex (the vertices are reduced). The reason for this is that when the vertices are increased, renumbering is necessary after the newly increased vertex, whereas the renumbering is not necessary when the vertices are reduced. In such (reduction) case, only removal is needed. Accordingly, contrary to what is asserted by the Examiner, there cannot be found the portion that the estimation value is necessary to be recalculated as a result of the previous data reductions caused by the conversion of the vertices.

Further, in Lobregt, the minimum length or the maximum length between the vertices is respectively defined a limited value. As a result, the removal and the insertion of the vertex are **NOT** to be repeated at the same position. Lobregt does **NOT** disclose the “prohibition area”.

In Lobregt, the portion where the insertion is conducted is, as a result, not an object to be removed in the next step (or vice versa). Lobregt does **NOT** disclose that the portion that the estimation value is necessary to be recalculated as a result of the data calculation caused by the conversion of the vertices is **NOT** to be a target of the data reduction.

As mentioned above, the present invention defined by amended independent claims 1, 4, 8 and 15, is different from the arrangement of Lobregt. Consequently, amended independent claim 1, 4, 8 and 15, as well as dependent claims 5-7 and 17-20, are patentable over Lobregt and their allowance is respectfully solicited.

Further, the dependent claims of the present invention are different from Lobregt by the same reason with above.

**II.** Claims 3, 14, 21 and 22 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Lobregt in view of Garland et al. (Surface Simplification Using Quadric Error Matrices).

The difference between the independent claims and Garland et al. was explained in the previous response and will not be repeated here.

In addition to such difference, as claim 3 depends from amended claim 1, claim 14 depends from amended claim 8 and claims 21 and 22 depend from amended claim 15, claims 3, 14, 21 and 22 are patentable over Lobregt also, even when considered in view of Garland et al. Consequently, the allowance of claims 3, 14, 21 and 22 is respectfully solicited.

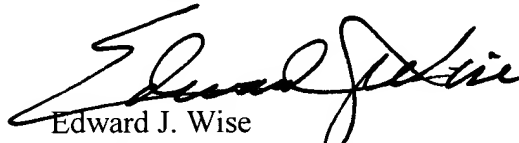
**CONCLUSION**

Accordingly, it is urged that the application, as now amended, is in condition for allowance, an indication of which is respectfully solicited. If there are any outstanding issues that might be resolved by an interview or an Examiner's amendment, Examiner is requested to call Applicants' attorney at the telephone number shown below.

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

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